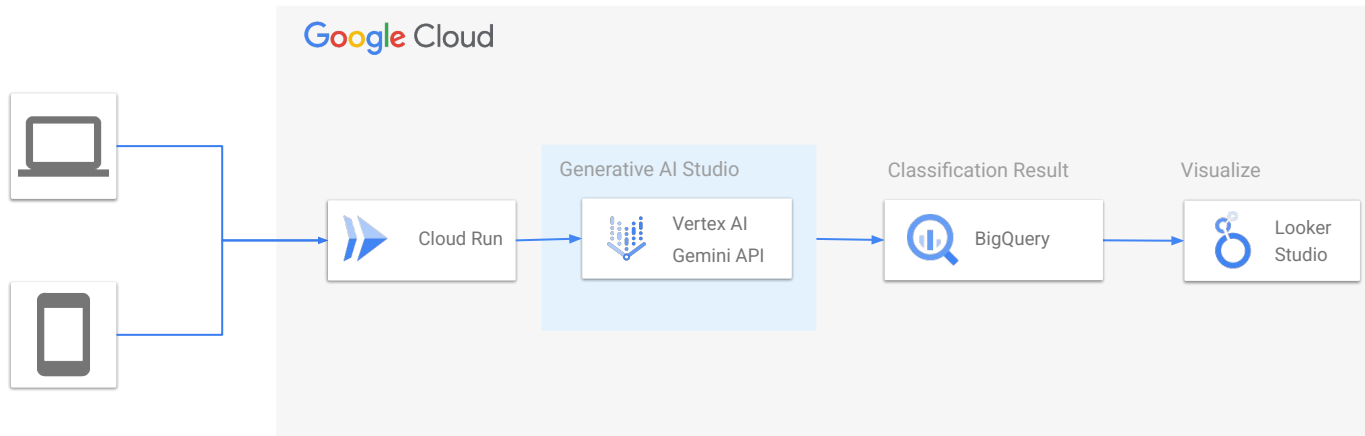# Text classification with Gemini on Cloud Run

Example of a LLM (Gemini) on GenAI Studio for text classification.

One possible scenario would be to input articles into the Gemini API via appreciation on Cloud Run, classify them into categories, and then store the data in BigQuery.

You could also use a BI tool like Looker or Looker Studio to visualize the data.

Architecture: Text classification with PaLM on Gen AI Studio

Google Cloud

Cloud Run

Generative AI Studio

Vertex AI Gemini API

Classification Result

BigQuery

Visualize

Looker Studio
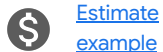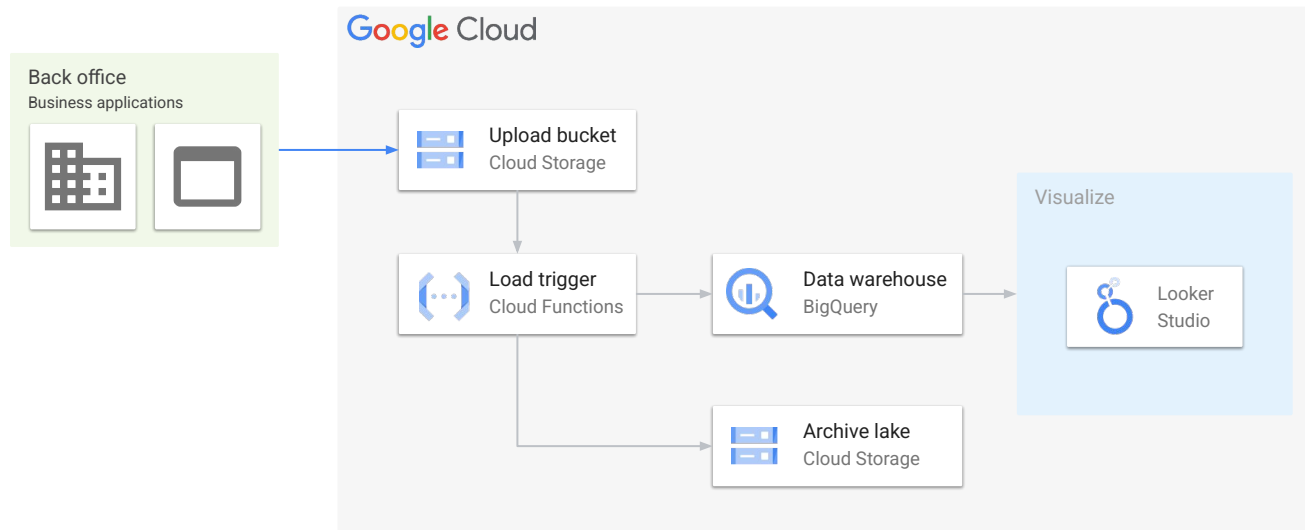
Estimate example

Click to deploy

Data analytics platform event-driven

This example shows how to create a data analytics platform that allows you to load data from transactional systems to BigQuery.

In this example, back office systems export files in supported formats for batch loading into Cloud Storage and upload them to BigQuery.

Cloud Function, used as a Cloud Storage trigger, triggers the load API to load the files from the upload bucket to BigQuery, then moves them to an archive bucket.

Architecture: Data analytics platform event-driven

Google Cloud

Back office
Business applications

Upload bucket
Cloud Storage

Load trigger
Cloud Functions

Data warehouse
BigQuery

Archive lake
Cloud Storage

Visualize

Looker Studio

Estimate example

Click to deploy
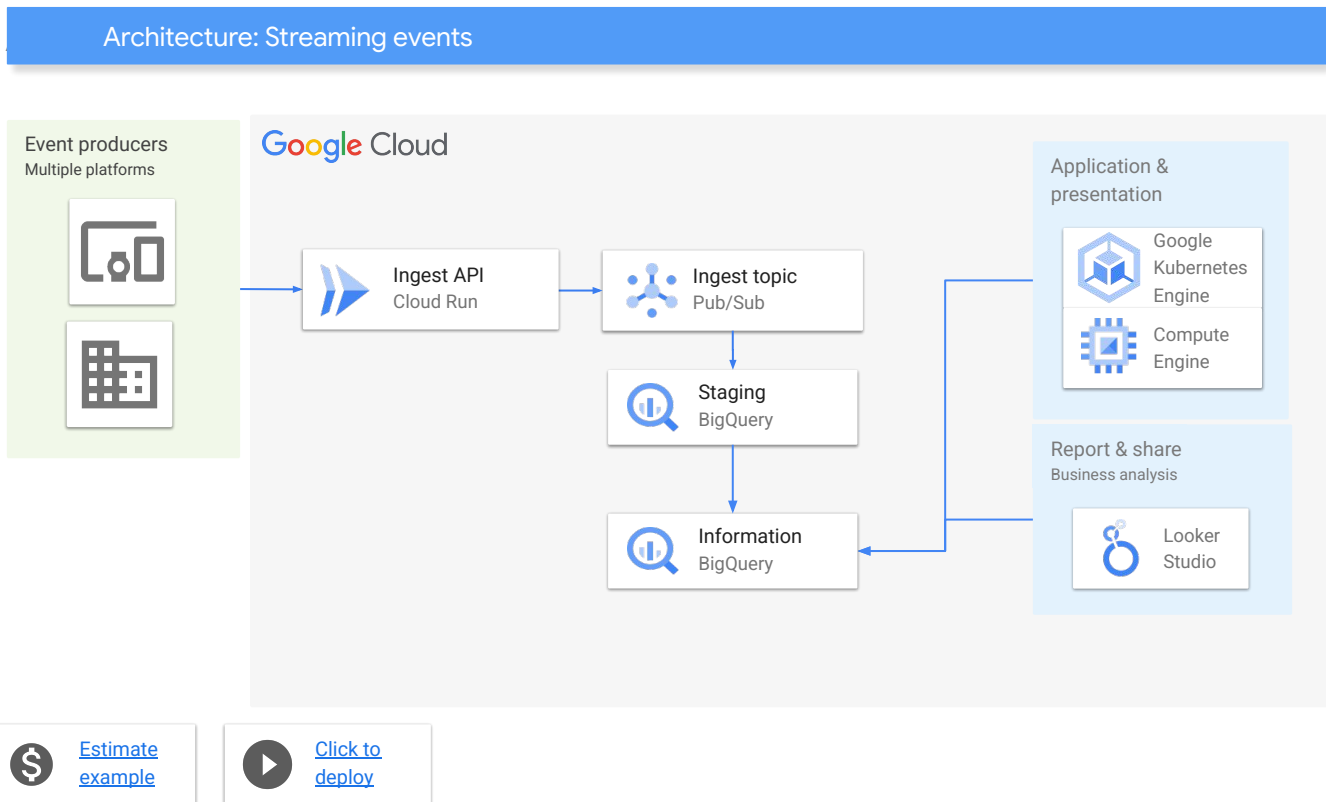
Streaming data to analytics

Example of streaming events directly to BigQuery for near real-time analytics.

Event producers call an Ingest API in order to post events. An Ingest API runs on Cloud Run, which allows autoscaling based in load and receives the requests. Pub/Sub Ingest topic has a BigQuery subscription that streams the messages directly to BigQuery.

BigQuery materialized views help users to normalized the data in the staging area in an information layer, accessible to the end users.

This solution allows users to view data in real-time with Looker Studio or Looker.

The estimate example considers a single event ingestion.

Architecture: Streaming events

Google Cloud

Event producers
Multiple platforms

Ingest API
Cloud Run

Ingest topic
Pub/Sub

Staging
BigQuery

Information
BigQuery

Application & presentation

Google Kubernetes Engine

Compute Engine

Report & share
Business analysis

Looker Studio

Estimate example
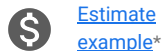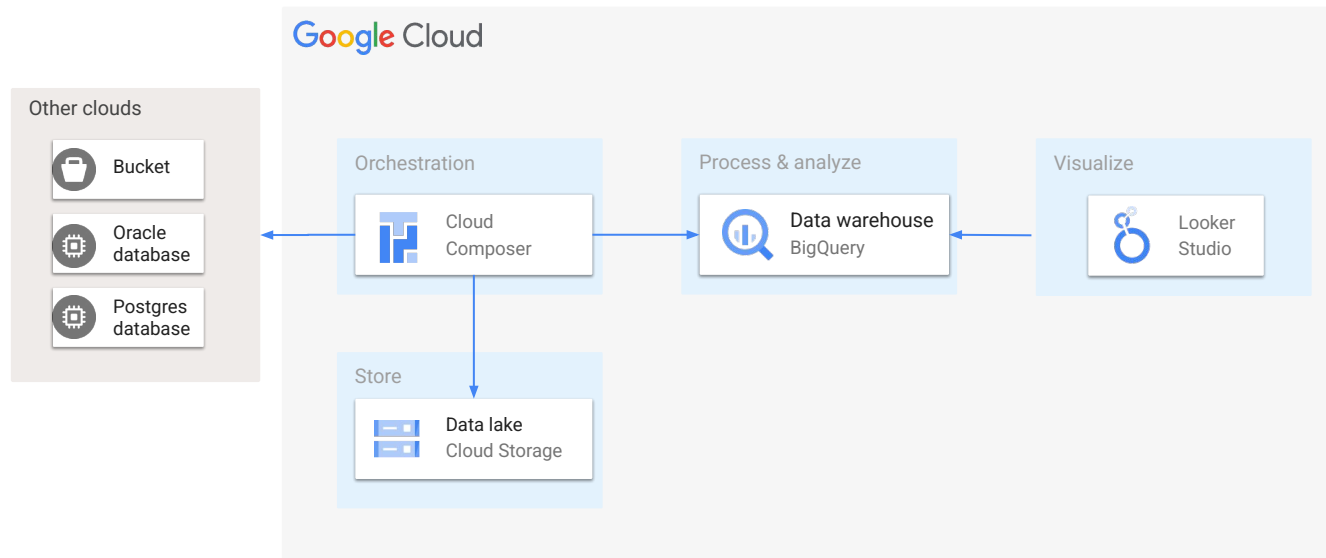
Click to deploy

Data integration with Cloud Composer

This example shows how to integrate data from on-premises systems or other clouds using Cloud Composer.

In this example, Cloud Composer workflows, also known as DAGs, extract data from relational databases, get files from buckets, and store them into a Data Lake in Cloud Storage.

Also, it has workflows that read objects in Cloud Storage, load them into BigQuery, then transform the data for analytics. Users can visualize the data with Looker Studio or Looker.

* Looker license price not included

Architecture: Data integration with Cloud Composer

Google Cloud

Other clouds

Bucket

Oracle database

Postgres database

Orchestration

Cloud Composer

Process & analyze

Data warehouse
BigQuery

Visualize

Looker Studio

Store

Data lake
Cloud Storage
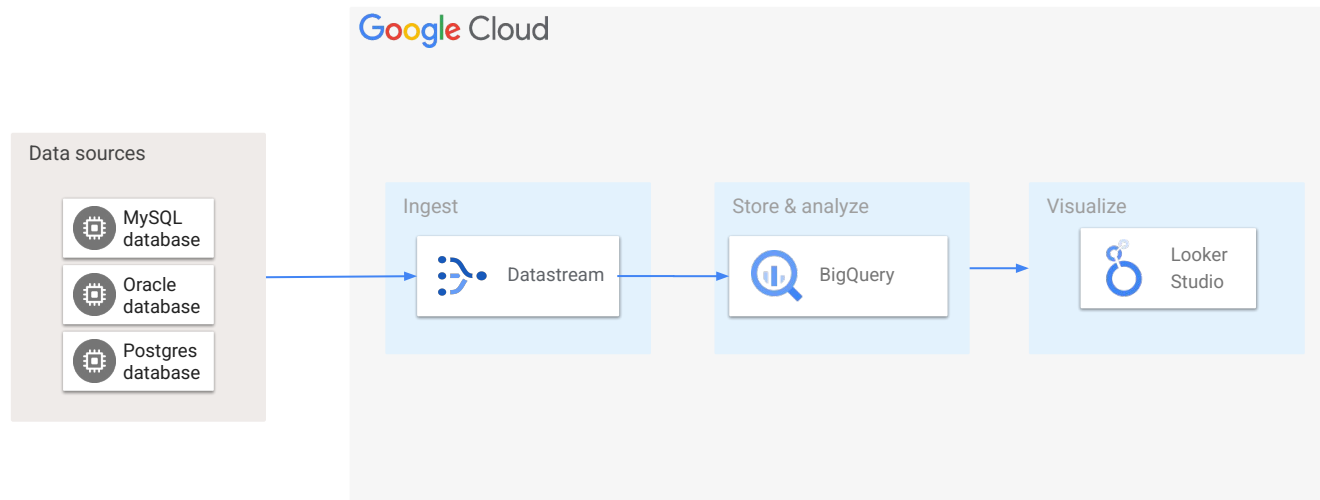
Estimate example*

Click to deploy

Replicating databases to BigQuery

Example of a real-time analytics solution with databases replication to [BigQuery](#).

[Datastream for BigQuery](#) allows you to create replication jobs using MySQL, Oracle, and Postgres databases as data sources and BigQuery as the destination.

This solution allows customers with traditional databases to stream data changes directly to BigQuery and visualize the data with [Looker Studio](#) or [Looker](#).

Architecture: Replicating databases to BigQuery

Google Cloud

Data sources
- MySQL database
- Oracle database
- Postgres database

Ingest — Datastream

Store & analyze — BigQuery

Visualize — Looker Studio

[Estimate example](#)

[Click to deploy](#)

# Batch prediction machine learning (ML) platform

This is an example of building a machine learning platform for batch prediction.

BigQuery ML allows you to build machine learning models and execute predictions using SQL without having to move data from BigQuery. Using the model supported by BigQuery ML, you can forecast demand, present recommended products, and classify users for campaign measures.

In this example, using the recent weekly transaction data of 500 MiB out of 5-year historical data, a model predicts the lifetime value of 1 million customers the following week.

Estimate example

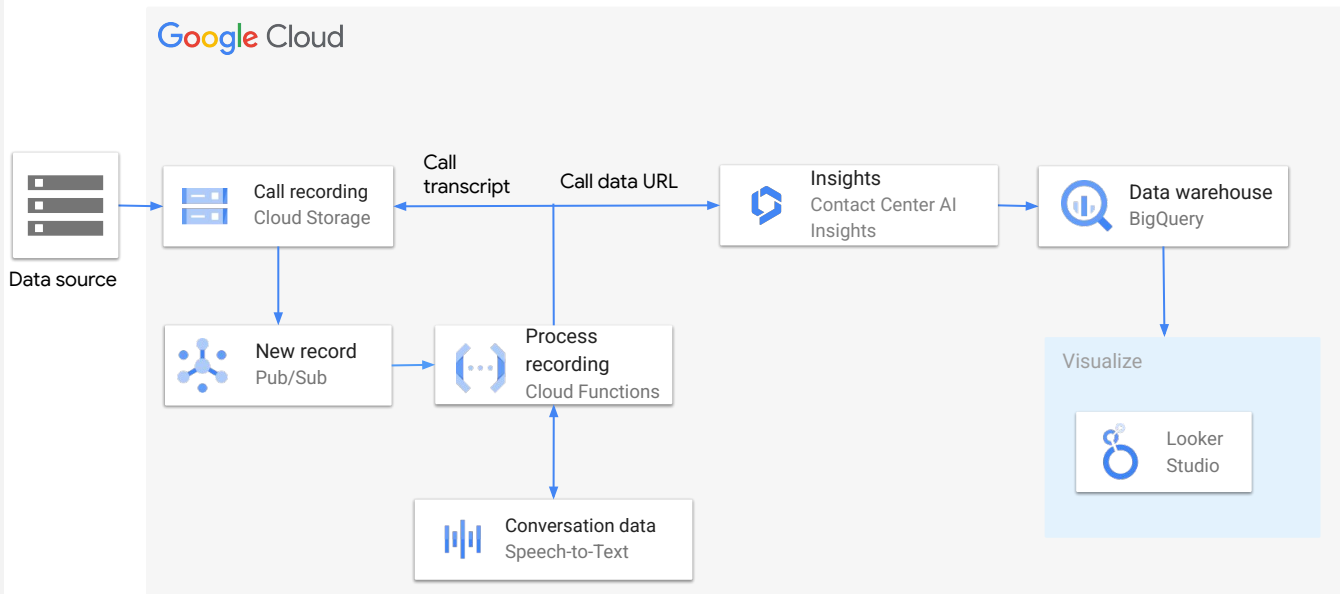Architecture: Batch prediction ML platform
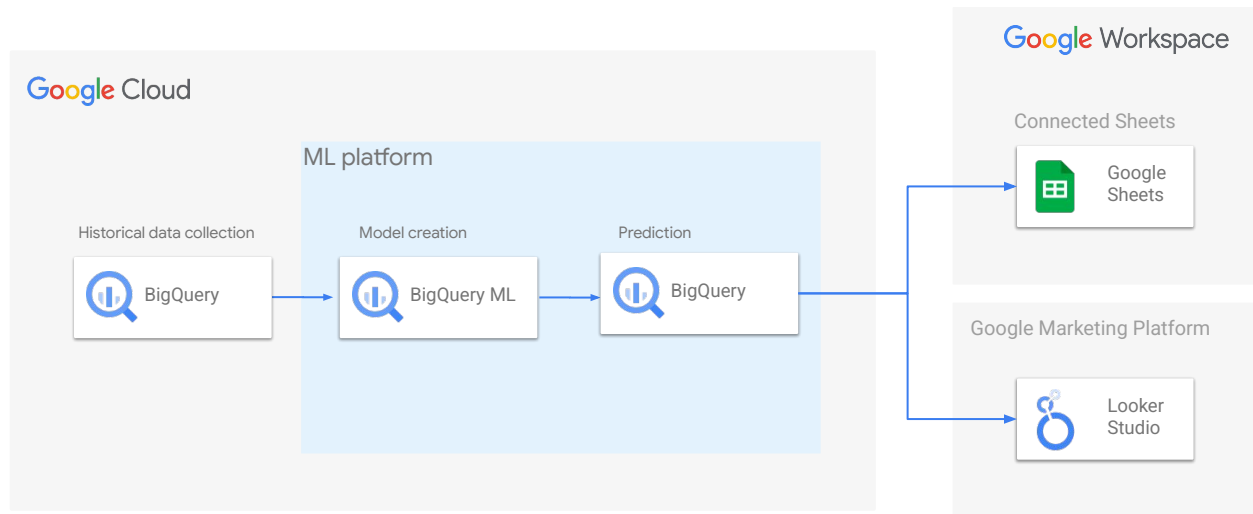
Contact Center AI Insights third-party integration

Example of Contact Center AI Insights standalone integration to a third-party software

The user uploads the call recordings to a [Cloud Storage](#) bucket. Then, the upload event is registered and processed by Pub/Sub which invokes a Cloud Function for transcription. After processing the call data, the function uses Cloud Storage and Contact Center AI Insights API to upload the transcript into the bucket, and import the recording into Contact Center AI Insights for analysis respectively.

Once the analysis is complete, you can either use the CCAI console to look at the data or export it to BigQuery to create a dashboard.

Architecture: Standalone Contact Center AI Insights third-party integration

Google Cloud

Data source

Call recording
Cloud Storage

New record
Pub/Sub

Process recording
Cloud Functions

Conversation data
Speech-to-Text

Call transcript

Call data URL

Insights
Contact Center AI Insights

Data warehouse
BigQuery

Visualize
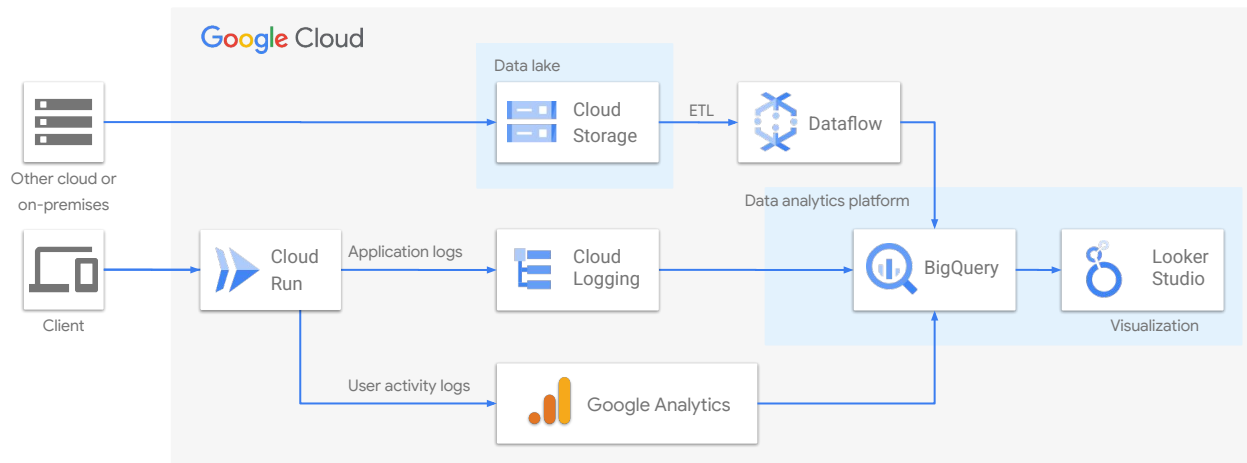
Looker Studio

[Estimate example](#)

Log analysis platform

A platform that analyzes various logs of applications running in Google Cloud, other clouds, and on-premises environments.

Logs from container applications on Cloud Run are aggregated to Cloud Logging by default. Logs of applications running in other clouds or on-premises environments can also be transferred to Cloud Storage as a data lake, then ETL processed using Dataflow as needed, and saved in BigQuery. Google Analytics can also be aggregated.

Various logs stored in BigQuery can be easily analyzed using SQL queries or visualization tools such as Looker Studio.

Estimate example

Architecture: Log analysis platform

Google Cloud

Other cloud or on-premises

Client

Data lake

Cloud Storage

ETL

Dataflow

Data analytics platform

Cloud Run

Application logs

Cloud Logging

BigQuery

Looker Studio

Visualization

User activity logs

Google Analytics

Real-time data streaming and analytics

This solution explores an example architecture pattern that ingests, processes, and analyzes a large number of events concurrently from many different sources. The processing happens as events unfold, enabling you to respond and make decisions in real-time.

Pub/Sub acts a pipeline for ingestion of real-time events. Dataflow performs the data transformation. That data is loaded into the BigQuery analytics engine.

Looker Studio or Looker can be used for creating dashboards and visualizing the data.

The pricing estimate assumes 100 MB per user per hour with 1,000 users. For steps and resources, refer to How to build a mobile gaming analytics platform on Google Cloud.

Architecture: Real-time data streaming and analytics

Estimate example
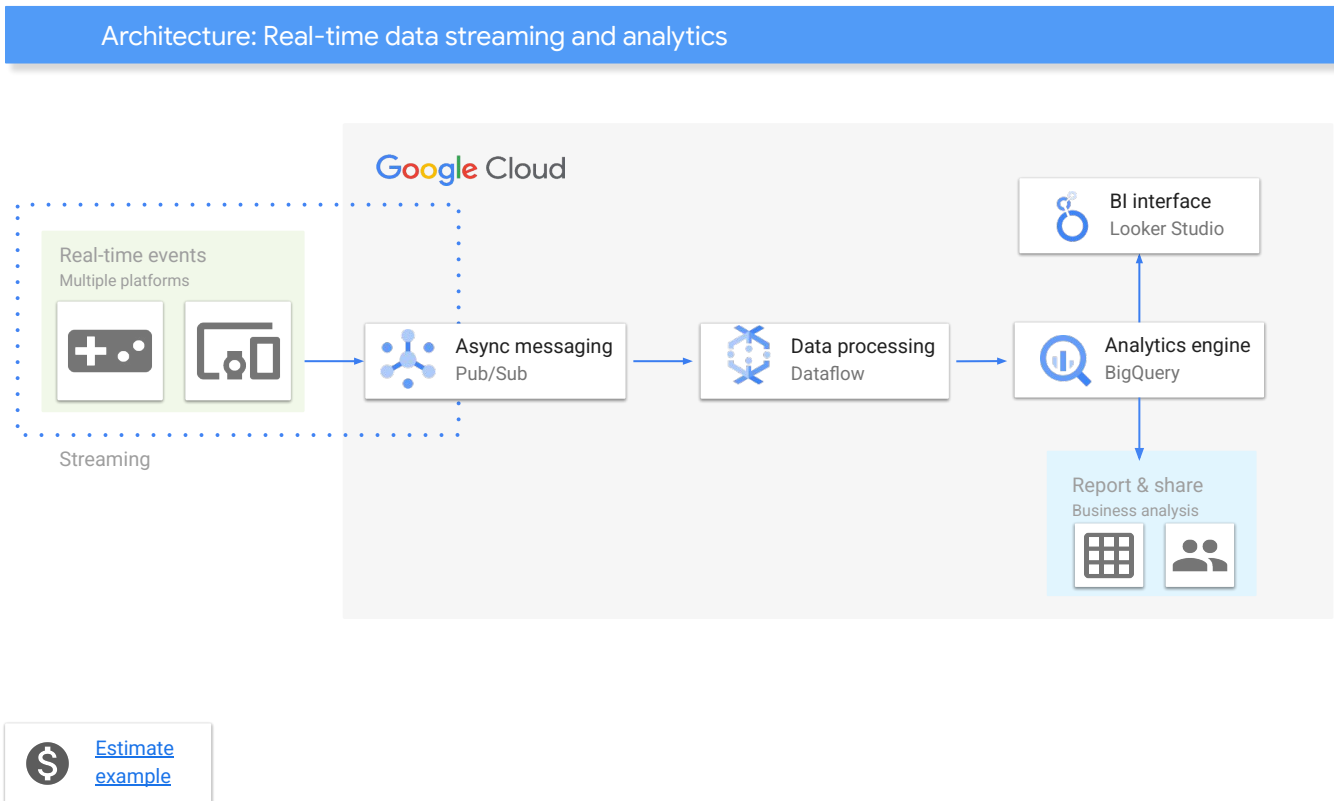
Marketing AI solution

Example of a Marketing AI solution with Google Analytics 4 (GA4).

GA4 BigQuery Export allows you to export all of your raw events from Google Analytics 4 properties to BigQuery.

This solution allows customers with GA4 data to visualize the raw data with Looker Studio and predict business impacts (LTV/Churn) with BigQuery ML. Looker supports actions like calling webhook and mailing action.

If customer experience enhancement is required, Looker is better to automate the operation.

Estimate example

Architecture: Marketing AI solution

Data sources

Google Analytics

Google Cloud

Store & analyze

BigQuery

Machine Learning

BigQuery ML

Visualize

Looker Studio

Report & share
Business analysis

Automation

Customer Experience

Ads services

Other media

Mailing action
DM
In-app notification

Contents optimization on Web/App

Looker